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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/647,569	08/25/2003	Lawrence D. Favro	WSU-00002	3250

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EXAMINER	
POLYZOS, FAYE S	

ART UNIT	PAPER NUMBER
2878	

DATE MAILED: 05/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/647,569	FAVRO ET AL.	
	Examiner	Art Unit	
	Faye Polyzos	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 August 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14 and 35-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14 and 35-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 August 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8/03, 11/03 8/04,* .
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 1-2, 6-9, 12-13, 35, 37, 40, 43, 46, 50-52, and 54 are rejected under 35 U.S.C. 102(e) as being anticipated by *Shepard et al (US 2002/0172410 A1).*

Regarding claim 1, *Shepard* discloses a defect detection system for detecting a defect in a structure (902), the system comprising: a sound source (910) for applying a sound input signal to the structure, the sound source being coupled to the structure (904) in a manner so that the sound signal induces acoustic chaos in the structure that causes the structure to vibrate in a chaotic manner and heat the defect; and a thermal imaging camera (906) for generating thermal images of the structure to identify the heated defect (See Generally Fig. 19 and [0061] and [0119]-[0127]).

Regarding claim 2, *Shepard* discloses wherein the force is applied to the sound source to couple the sound source to the structure in a manner that generates the acoustic chaos in the structure (See Generally Figs. 1 and 19).

Regarding claim 6, *Shepard* discloses the sound source includes a chaos signal generator and a transducer, the chaos signal generator generating a chaos signal that is applied to the transducer, the transducer causing the structure to vibrate in a chaotic manner (See Generally Fig. 19 and [0121-0122]).

Regarding claim 7, *Shepard* discloses the sound source includes an ultrasonic transducer, the ultrasonic transducer including a transducer horn that is coupled to the structure, and wherein the sound input signal generated by the ultrasonic transducer causes the transducer horn to impact against the structure (See Generally Fig. 19 and [0121-0122]).

Regarding claim 8, *Shepard* discloses the sound source includes an electromagnetic acoustic transducer ([0121]-[0123]).

Regarding claim 9, *Shepard* discloses the system comprises a device for determining vibrations of the structure in response to the sound input signal (See Generally Fig. 2 and [0124]-[0127]).

Regarding claim 12, *Shepard* discloses the acoustic chaos is defined by a range of frequencies providing a vibrational waveform whose spectral content is related to the frequency of the sound input signal by ratios of rational numbers ([0119]).

Regarding claim 13, *Shepard* discloses a system for creating chaos in a structure, the system comprising a sound source (910) coupled to the structure under a

predetermined force, the sound source applying a pulsed sound signal to the structure, wherein the amount of force, the duration of the pulsed sound signal and the frequency of the sound signal act to induce acoustic chaos in the structure and cause the structure to vibrate in a chaotic manner (See Generally Figs. 2 and 19 and ([0119]).

Regarding claim 35, *Shepard* discloses the sound input signal applied to the structure is a pulse signal having a pulse duration and frequency that act to induce the acoustic chaos in the structure ([0119]).

Regarding claim 37, *Shepard* discloses the sound input signal has a frequency of about 15-40 kHz ([0119]).

Regarding claim 40, *Shepard* discloses the sound source includes an ultrasonic transducer (910), the ultrasonic transducer generating a pulsed ultrasonic signal ([0121]).

Regarding claim 43, *Shepard* discloses the defect detection system for detecting a defect in a structure, the system comprising: an ultrasonic transducer (910) for applying an ultrasonic pulse signal to the structure (904), the transducer being coupled to the structure under a predetermined force, the ultrasonic pulse signal having a pulse width and frequency, wherein the predetermined force, the frequency of the ultrasonic signal and the pulse width of the ultrasonic signal are selected so that the ultrasonic signal induces acoustic chaos in the structure that causes the structure to vibrate in a chaotic manner and heat the defect; and a thermal imaging camera (906) for generating thermal images of the structure to identify the heated defect (See Generally Figs. 2, 19 and [0119]-[0127]).

Regarding claim 46, *Shepard* discloses the acoustic chaos is defined by a range of frequencies providing a vibrational waveform whose spectral content is related to the frequency of the ultrasonic pulsed signal by ratios of rational numbers ([0119]).

Regarding claim 50, *Shepard* discloses a method for detecting defects in a structure, comprising: applying a sound input signal from a sound source to the structure, the sound source being coupled to the structure in a manner so that the sound signal induces acoustic chaos in the structure that causes the structure to vibrate in a chaotic manner and heat the defect; and thermal imaging the structure to identify the heated defect (See Generally Figs. 2,19 and [0119]-[0129]).

Regarding claim 51, *Shepard* discloses applying a force to the sound source to couple the sound source to the structure in a manner that generates the acoustic chaos in the structure (See Generally Fig. 19 and [0119]).

Regarding claim 52, *Shepard* discloses measuring vibrations from the structure (See Generally Fig. 2 and [0119]).

Regarding claim 54, *Shepard* discloses coupling the sound input signal to the structure includes coupling a sound input signal into the structure that has a pulse duration and frequency that act to induce the acoustic chaos in the structure (See Generally Fig. 19 and [0119]).

Claim Rejections - 35 USC § 103

3. Claims 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Shepard* as applied to claim 1 above, and further in view of *Thomas et al (US 6399948 B1 A1).*

Regarding claims 3-5, Shepard discloses a defect detection system for detecting a defect in a structure wherein the transducer is connected to the structure of the system (See Generally Fig. 19 and [0119]). Shepard does not disclose of a coupler to couple the transducer to the structure to induce acoustic chaos in the structure to heat the defect. *Thomas* discloses a coupler (16) coupling the transducer (14) to the structure (12), wherein the transducer converts the chaos signal to a sound that is applied to the structure through the coupler, wherein the sound signal induces acoustic chaos in the structure that acts to heat the defect (See Generally Fig. 1). *Thomas* teaches the coupler can be any suitable piece of material that is typically softer than the end of the transducer and is malleable to be deformed against the end of the transducer and prevent the transducer from bouncing from or walking along the specimen (col. 4, lines 63-67). Therefore, it would have been obvious to modify the detection system disclosed by Shepard to include a coupler as disclosed supra by *Thomas* to allow for a more versatile apparatus.

4. Claims 10-11, 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Shepard* as applied to claim 9 above, and further in view of *Toomey et al (US 2003/0014199 A1).* .

Regarding claims 10-11, *Shepard* discloses of defect detection system comprising a device to determine depth of the surface defects and other defect properties ([0005]). *Shepard* does not disclose of a vibration device. *Toomey* discloses of a device for determining vibrations wherein the device is a vibrometer ([0007]). *Toomey* teaches the optical vibration sensor (12) can be a laser vibrometer or other

device capable of optically sensing vibrations (26) of a structure (14) (See Generally Fig. 1 and [0056]). Therefore, it would have been obvious to modify the apparatus suggested by *Shepard* so as to include a laser vibrometer or other device capable of optically sensing vibrations as suggested supra by *Toomey* to allow for a more versatile apparatus.

Regarding claim 36, *Toomey* disclose of the vibrometer being a doppler laser vibrometer, it is well known in the art doppler lasers are utilized to detect vibrations and it would have been a matter of routine design choice to incorporate such a laser as the device to determine vibrations of the structure ([0056]).

5. Claims 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Shepard* as applied to claim 13 above, and further in view of *Thomas et al (US 6399948 B1 A1).*

Regarding claims 38-39, Shepard discloses a defect detection system for detecting a defect in a structure wherein the transducer is connected to the structure of the system (See Generally Fig. 19 and [0119]). Shepard does not disclose of a coupler to couple the transducer to the structure to induce acoustic chaos in the structure to heat the defect. *Thomas* discloses a coupler (16) coupling the transducer (14) to the structure (12), wherein the transducer converts the chaos signal to a sound that is applied to the structure through the coupler, wherein the sound signal induces acoustic chaos in the structure that acts to heat the defect (See Generally Fig. 1). *Thomas* teaches the coupler can be any suitable piece of material that is typically softer than the end of the transducer and is malleable to be deformed against the end of the transducer

and prevent the transducer from bouncing from or walking along the specimen (col. 4, lines 63-67). Therefore, it would have been obvious to modify the detection system disclosed by Shepard to include a coupler as disclosed supra by *Thomas* to allow for a more versatile apparatus.

6. Claims 14 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Shepard* in view of *Thomas et al (US 6399948 B1 A1).*

Regarding claim 14, Shepard discloses a defect detection system for detecting a defect in a structure, the system comprising: an electronic chaos signal generator for generating a chaos signal; a broadband transducer responsive to chaos signal from the chaos signal generator (See Generally Fig. 19 and [0119]). Shepard does not disclose of a coupler to couple the transducer to the structure to induce acoustic chaos in the structure to heat the defect. *Thomas* discloses a coupler (16) coupling the transducer (14) to the structure (12), wherein the transducer converts the chaos signal to a sound that is applied to the structure through the coupler, wherein the sound signal induces acoustic chaos in the structure that acts to heat the defect (See Generally Fig. 1). *Thomas* teaches the coupler can be any suitable piece of material that is typically softer than the end of the transducer and is malleable to be deformed against the end of the transducer and prevent the transducer from bouncing from or walking along the specimen (col. 4, lines 63-67). Therefore, it would have been obvious to modify the detection system disclosed by Shepard to include a coupler as disclosed supra by *Thomas* to allow for a more versatile apparatus.

Regarding claim 41, Shepard discloses of a thermal imaging camera (906) for generating thermal images of the structure to identify the heated defect (See Generally Fig. 19)

Regarding claim 42, Shepard discloses the chaos signal from the electronic chaos signal generator is applied to a power amplifier that amplifies the signal before it is applied to the broadband transducer (See Generally Fig. 19 and [0119]).

7. Claims 44-45 and 47-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Shepard* as applied to claim 43 above, and further in view of *Thomas et al (US 6399948 B1 A1).*

Regarding claims 44-45, Shepard discloses a defect detection system for detecting a defect in a structure wherein the transducer is connected to the structure of the system (See Generally Fig. 19 and [0119]). Shepard does not disclose of a coupler to couple the transducer to the structure to induce acoustic chaos in the structure to heat the defect. *Thomas* discloses a mechanical coupler (16) in contact with the transducer and the structure, the ultrasonic signal being coupled to the structure through the coupler, the coupler being made of a predetermined material and having a predetermined thickness that act to induce the acoustic chaos (See Generally Fig. 1). *Thomas* teaches the coupler can be any suitable piece of material that is typically softer than the end of the transducer and is malleable to be deformed against the end of the transducer and prevent the transducer from bouncing from or walking along the specimen (col. 4, lines 63-67). Therefore, it would have been obvious to modify the

detection system disclosed by Shepard to include a coupler as disclosed supra by *Thomas* to allow for a more versatile apparatus.

Regarding claims 47-49, *Shepard* discloses of defect detection system comprising a device to determine depth of the surface defects and other defect properties ([0005]). *Shepard* does not disclose of a vibration device. discloses of a device for determining vibrations wherein the device is a vibrometer ([0007]). *Toomey* teaches the optical vibration sensor (12) can be a laser vibrometer or other device capable of optically sensing vibrations (26) of a structure (14) (See Generally Fig. 1 and [0056]). Therefore, it would have been obvious to modify the apparatus suggested by *Shepard* so as to include a laser vibrometer or other device capable of optically sensing vibrations as suggested supra by *Toomey* to allow for a more versatile apparatus.

8. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Shepard* as applied to claim 51 above, and further in view of *Thomas et al (US 6399948 B1 A1).*

Regarding claim 53, Shepard discloses a defect detection system for detecting a defect in a structure wherein the transducer is connected to the structure of the system (See Generally Fig. 19 and [0119]). Shepard does not disclose of a coupler to couple the transducer to the structure to induce acoustic chaos in the structure to heat the defect.. *Thomas* discloses a mechanical coupler (16) in contact with the transducer and the structure, the ultrasonic signal being coupled to the structure through the coupler, the coupler being made of a predetermined material and having a predetermined thickness that act to induce the acoustic chaos (See Generally Fig. 1). *Thomas* teaches the coupler can be any suitable piece of material that is typically softer than the end of

the transducer and is malleable to be deformed against the end of the transducer and prevent the transducer from bouncing from or walking along the specimen (col. 4, lines 63-67). Therefore, it would have been obvious to modify the detection system disclosed by Shepard to include a coupler as disclosed supra by *Thomas* to allow for a more versatile apparatus.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Polyzos whose telephone number is 571-272-2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

11. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

FP

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